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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/064,829	08/21/2002	Chellappa Balan	124719	9788

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EXAMINER	
DOVE, TRACY MAE	
ART UNIT	**PAPER NUMBER**
1745	

DATE MAILED: 12/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No.	Applicant(s)	
	10/064,829	BALAN, CHELLAPPA	
	Examiner	Art Unit	
	Tracy Dove	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 November 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This Office Action is in response to the communication filed on 11/13/06. Applicant's arguments have been considered, but are moot. Claims 1-14 are pending.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/13/06 has been entered.

Claims Analysis

The limitation "to allow a flow of a fluid from the upper channels through the lower channels" in claims 1 and 7 is not given patentable weight because the claims are directed toward an apparatus.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 5, 7-9 and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by Nelson, US 6,689,500.

Nelson teaches a fuel cell system that includes fuel cells and cooling elements distributed among the fuel cells. Each fuel cell includes an anode element, a cathode element and an associated electrolytic member sandwiched between the anode and cathode elements (1:52-61). The fuel cell stack includes a cathode plate and an anode plate. The cathode plate has a cathode reactant surface and a cathode cooling surface opposite the cathode reactant surface. The anode plate has an anode reactant surface and an anode cooling surface opposite the anode reactant surface. The cathode plate (base plate) includes a passthrough (cavity) opening from the cooling channel (lower channels) or the cathode cooling surface to the cathode reactant surface (upper channels) (2:17-37). Figures 6A and 6B depict the reactant surface of the cathode plate and Figure 6C depicts the cooling surface of the cathode plate. As shown in Figures 6A-6C the reactant surface channels are parallel to the cooling surface channels of the cathode plate. The passthrough 68 connects the cooling channel (2:31-33) to the reactant channels 28 of the cathode plate (Figure 4 and 6:47-54). Nelson teaches PEM fuel cells (5:14-30).

Thus the claims are anticipated.

*

Claims 1, 2, 5-9, 13 and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Jones et al., US 5,998,054.

Jones teaches a polymer electrolyte fuel cell comprising an anode, a cathode and an electrolyte. Figure 4 shows a fuel cell fluid flow plate 120``(base plate) comprising a first face 122 (upper section) and a second face 122`` (lower section) wherein the first face 122 comprises serpentine flow channels 124`` (upper channel) and the second face 122`` comprises channels 140``(lower channel). The channels 124`` and 140`` are fluidly connected by an injection port

131`` (cavity) (7:44-50). The injection of water through the port affects the heat transfer between the reactant fluid in the flow plate channels 124`` and a fuel cell component (4:55-61). The fluid flow plate 120 may be a bipolar, monopolar, anode cooler or cathode cooler plate. Face 122 is an anode side or cathode side of the fluid flow plate. The flow channels carry an appropriate reactant fluid such as hydrogen or air/oxygen (5:33-45). See column 6, lines 50-65. Where the fluid flow plate 120 is a bipolar plate, an opposite face 122` (not shown) similarly can have a metering area 130` positioned approximately at inlets 126` of flow channels 124`, as will be understood by those skilled in the art. For instance, a repetition of the machining pattern depicted on Fig. 2 on the opposite face of that same fluid flow plate desirably would provide a metering area at a consecutive corner of the plate, which would allow convenient connection to another fluid manifold for supply of an appropriate reactant fluid (7:5-15). Additionally, working section 114 could easily include fuel cells other than PEM-type fuel cells (8:28-29). Figure 2 shows a flow plate having upper channels 124 in a serpentine pattern. Since portions of the serpentine channels run north-south and portions of the channels run east-west, some of the channels will be parallel to the lower channels 140. Thus the claims are anticipated.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 6 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson, US 6,689,500 in view of Kusunoki et al., US 5,789,094, and further as evidenced by the present specification, [0014].

Nelson teaches a fuel cell system that includes fuel cells and cooling elements distributed among the fuel cells. Each fuel cell includes an anode element, a cathode element and an associated electrolytic member sandwiched between the anode and cathode elements (1:52-61). The fuel cell stack includes a cathode plate and an anode plate. The cathode plate has a cathode reactant surface and a cathode cooling surface opposite the cathode reactant surface. The anode plate has an anode reactant surface and an anode cooling surface opposite the anode reactant surface. The cathode plate (base plate) includes a passthrough (cavity) opening from the cooling channel (lower channels) or the cathode cooling surface to the cathode reactant surface (upper channels) (2:17-37). Figures 6A and 6B depict the reactant surface of the cathode plate and Figure 6C depicts the cooling surface of the cathode plate. As shown in Figures 6A-6C the reactant surface channels are parallel to the cooling surface channels of the cathode plate. The passthrough 68 connects the cooling channel (2:31-33) to the reactant channels 28 of the cathode plate (Figure 4 and 6:47-54). Nelson teaches PEM fuel cells (5:14-30).

Nelson does not explicitly state the material of the cathode plate.

However, Kusunoki teaches fuel cells having oxidant gas flow and fuel gas flow may have flow plates made of copper, nickel and/or stainless steel (16:29-59).

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one of skill would have been motivated use the stainless steel plate of Kusunoki for the cathode plate of Nelson because stainless steel is

commonly used for plates of fuel cells. Furthermore, the instant specification states the materials of claims 6 and 14 are "typically" used for fuel cell plates (0014).

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Claims 3, 4, 6, 10-12 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson, US 6,689,500 in view of Bunker, US 7,022,429.

Nelson teaches a fuel cell system that includes fuel cells and cooling elements distributed among the fuel cells. Each fuel cell includes an anode element, a cathode element and an associated electrolytic member sandwiched between the anode and cathode elements (1:52-61). The fuel cell stack includes a cathode plate and an anode plate. The cathode plate has a cathode reactant surface and a cathode cooling surface opposite the cathode reactant surface. The anode plate has an anode reactant surface and an anode cooling surface opposite the anode reactant surface. The cathode plate (base plate) includes a passthrough (cavity) opening from the cooling channel (lower channels) or the cathode cooling surface to the cathode reactant surface (upper channels) (2:17-37). Figures 6A and 6B depict the reactant surface of the cathode plate and Figure 6C depicts the cooling surface of the cathode plate. As shown in Figures 6A-6C the reactant surface channels are parallel to the cooling surface channels of the cathode plate. The passthrough 68 connects the cooling channel (2:31-33) to the reactant channels 28 of the cathode plate (Figure 4 and 6:47-54). Nelson teaches PEM fuel cells (5:14-30).

Nelson does not explicitly state the channels have a plurality of concavities disposed on a surface portion.

However, Bunker teaches a fuel cell having a plurality of concavities disposed on at least one of a thermal management and electrolytic sections so as to cause hydrodynamic interactions

and affect the heat transfer rate between a fluid and the concavities when the fluid is disposed over the concavities (abstract). See Figures 3-6. The electrolytic section comprises an anode 190, a cathode 200 and an electrolyte 210. The thermal management section includes an oxidant section 150 and a fuel section 160. The oxidant and fuel section may be made of sheet metal such as stainless steel sheet metal (5:15-17). The concavities are selected from depressions, indentations, dimples or pits (claim 8).

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because the plurality of concavities disposed on at least one of a thermal management and electrolytic sections, as disclosed by Bunker, could have been used for the fuel cell cooling elements and/or electrode surfaces of Nelson to improve hydrodynamic interactions and affect the heat transfer rate between a fluid and the concavities when the fluid is disposed over the concavities. One of skill would have found it obvious to use the concavities of Bunker on any fuel cell having thermal management and/or electrolytic sections so as to cause hydrodynamic interactions and affect the heat transfer rate between a fluid and the concavities when the fluid is disposed over the concavities

Response to Arguments

Applicant's arguments with respect to claims 1, 2, 5-9, 13 and 14 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is 571-272-1285. The examiner can normally be reached on Monday-Thursday (9:00-7:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TRACY DOVE
PRIMARY EXAMINER
11/06